

average elevation of the Park is 350 m above msl. The temperature fluctuates from 48 °C in summer to as low as 2 °C in the winter. During the rainy season, which extends from July to September, the Park receives about 800 mm of rainfall. It has a Mixed Dry Deciduous and Thorn Forest, predominantly comprising of *Anogeissus pendula*. The following observation was made during a 17-day trip to the Ranthambore National Park in January 2000.

Ali and Ripley (1987) recorded three subspecies of the rock bunting *Emberiza cia* — the Himalayan, the Tibetan and the Transcaspian. The Himalayan subspecies *E. cia stracheyi* is restricted to the Western Himalaya, through Kashmir and Nepal. The Tibetan subspecies *E. cia khamensis* is found in southeastern Tibet, northern Arunachal Pradesh, Bhutan, Sikkim and eastern Nepal. Interestingly, the Transcaspian subspecies *E. cia par* is known to exist all the way from the NWFP, Ladakh, Lahul and Spiti (summer grounds) to Punjab foothills (below 600 m), Ambala (Haryana), Delhi and Dehra Dun (wintering grounds). There is also a mention of a specimen from Varanasi (Benares, Uttar Pradesh). All the three subspecies are known to be common wherever they exist.

I saw a pair of *E. cia*, in all probability *E. cia par* (Transcaspian subspecies), the paler of the three subspecies, on two separate occasions in Ranthambore on 20th and 23rd January, 2000

respectively. On both instances, it was seen in the evening in open grassland interspersed with *Anogeissus pendula* and *Acacia* sp. In fact, a pair was once seen along with a flock of white-capped buntings *E. stewarti*. The lateral black crown stripes and the bluish-grey throat of the male *E. cia* easily distinguish it from *E. stewarti*, which has an uniform grey crown with a conspicuous black throat patch. While *E. stewarti* winters regularly in many parts of Rajasthan, the range of *E. cia* within Rajasthan is unknown.

Grimmett *et al.* (1999) and Kazmierczak (2000) have shown the species in Maharashtra in the distribution maps without giving specific references. These are interesting records, and in case we consider them bonafide, the bird should also occur along the corridor that links Maharashtra to its summer grounds in Himachal Pradesh and Ladakh. In the light of such an assumption, it is not improbable to find the bird in Ranthambore (east Rajasthan) during winter, when the birds, in a bid to escape the severe cold, scatter from their breeding grounds situated in the higher reaches of the Himalayas. The sighting invites us to investigate its distribution in other regions of Rajasthan and Madhya Pradesh.

November 25, 2000 ANISH P. ANDHERIA
2, Sagar Building, V.P. Road,
Andheri (West), Mumbai 400 058,
Maharashtra, India.

REFERENCES

ALI, S. & S.D. RIPLEY (1987): Handbook of the Birds of India and Pakistan (Compact Edition). Oxford University Press, New Delhi.
GRIMMETT, R., C. INSKIPP & T. INSKIPP (1999): Birds of the

Indian Subcontinent. Oxford University Press.
KAZMIERCZAK, K. (2000): A Field Guide to the Birds of the Indian Subcontinent. Pica Press, Robertsbridge, UK.

31. FRUIT AND NECTAR RESOURCES IN A MOIST DECIDUOUS FOREST AND THEIR USE BY BIRDS — A PRELIMINARY REPORT

It is important to identify key plant resources used by wildlife to effect conservation and management actions (Kannan and James 1999). While there have been extensive studies

on frugivory and nectarivory and on related aspects like seed dispersal and pollination abroad, very little is known about these topics in our country, but for a few studies e.g. Rajasekhar

(1995); Karthikeyan (1996); Thirumurthi and Banumathi (1998); Santharam (1996a, b); Athreya (1996) and Shahabuddin (1993) and references therein.

In this note, I report some findings on the use of fruit and nectar resources by birds in the Peechi-Vazhani Wildlife Sanctuary in Thrissur district, Kerala, which were made between September 1991 and May 1993 while studying the ecology of woodpeckers. The data is limited and may be treated as preliminary findings. I have concentrated mainly on species other than *Ficus* and *Bombax* which are well known as the major sources of fruits and nectar respectively, and attract the greatest number of bird species (Ali and Ripley 1983, Athreya 1996).

I kept notes on the flowering and fruiting of the more common and conspicuous plants in the Moist Deciduous Forest and the teak *Bombax ceiba* plantation at five 10 ha plots in the Peechi-Vazhani Wildlife Sanctuary. All the sites were within 100 m elevation. No data was collected during the peak of the monsoon (June-August). Birds visiting the trees for foraging on nectar and fruits were noted

at all available opportunities.

The flowering/fruiting schedules of the important 'bird' plants are given in Table 1, which shows that there is a tendency for the nectar and fruit resources to be available more in the dry months (January-April). Most plant species offer fruits or nectar for short periods of two months or less, with the exception of the *Ficus* spp. and mistletoes (*Loranthus*). In both these cases, several species are clumped together and hence the pattern of longer availability with short gaps.

Data on the various bird species that visited different plants offering fruits and nectar is presented in Table 2. This lists 12 plant and 43 bird species from 10 and 16 families, respectively. Twelve of the birds listed were seen feeding on nectar alone, 22 only on fruits while nine species were observed feeding on both fruits and nectar. Members of three families, Dicruridae, Dicaeidae and Nectariniidae consumed nectar alone. Six species of woodpeckers were found feeding on both nectar and fruits.

Table 1: Flowering/fruiting phenology

Plant species	Month									
	S	O	N	D	J	F	M	A	M	
Nectar										
<i>Bombax ceibia</i> (Bombacaceae)				x	x	x	x			
<i>Bombax insignae</i> (Bombacaceae)			x	x						
<i>Careya arborea</i> (Lecythidaceae)							x			
<i>Helicteres isora</i> (Sterculiaceae)	x	x								
<i>Firmiana colorata</i> (Sterculiaceae)							x	x		
<i>Loranthus</i> spp. (Loranthaceae)		x			x			x	x	
Fruits										
<i>Sterculia guttata</i> (Sterculiaceae)					x	x				
<i>Lannea coromandelica</i> (Anacardiaceae)								x		
<i>Macaranga peltata</i> (Euphorbiaceae)							x	x	x	
<i>Cleistanthus collinus</i> (Euphorbiaceae)					x					
<i>Persea macrantha</i> (Lauraceae)					x	x				
<i>Zizyphus oenoplia</i> (Rhamnaceae)				x	x					
<i>Grewia tilaefolia</i> (Tiliaceae)	x							x	x	
<i>Dillenia pentagyna</i> (Dilleniaceae)								x	x	
<i>Ficus</i> spp. (Moraceae)			x		x	x	x	x	x	x

MISCELLANEOUS NOTES

Table 2: Plants visited by birds for nectar/fruits

Bird Visitors	Plant Species											
	1	2	3	4	5	6	7	8	9	10	11	12
Columbidae												
Pompadour green pigeon (<i>Treron pompadora</i>)							✓			✓		
Yellow-legged green-pigeon (<i>Treron phoenicoptera</i>)										✓	✓	
Green imperial-pigeon (<i>Ducula aenea</i>)					✓			✓		✓		✓
Emerald dove (<i>Chalcophaps indica</i>)		✓										
Psittacidae												
Plum-headed parakeet (<i>Psittacula cyanocephala</i>)				✓		✓	✓				✓	
Indian hanging-parrot (<i>Loriculus vernalis</i>)		✓	✓	✓		✓	✓				✓	
Cuculidae												
Asian koel (<i>Eudynamys scolopacea</i>)					✓			✓				
Capitonidae												
Small green barbet (<i>Megalaima viridis</i>)					✓			✓				
Picidae												
Little scaly-beilled green woodpecker (<i>Picus xanthopygaeus</i>)	✓							✓				
Small yellow-naped woodpecker (<i>Picus chlorolophus</i>)								✓	✓			
Lesser golden-backed woodpecker (<i>Diröpium benghalense</i>)		✓				✓	✓	✓				
Yellow-fronted pied woodpecker (<i>Dendrocopos mahrattensis</i>)								✓				
Heart-spotted woodpecker (<i>Hemicircus canente</i>)											✓	
Greater golden-backed woodpecker (<i>Chrysocolaptes lucidus</i>)								✓				
Oriolidae												
Eurasian golden oriole (<i>Oriolus oriolus</i>)		✓	✓			✓	✓		✓			
Black-headed oriole (<i>Oriolus xanthornus</i>)	✓											

Table 2: Plants visited by birds for nectar/fruits (contd.)

Bird Visitors	Plant Species											
	1	2	3	4	5	6	7	8	9	10	11	12
Dicruridae												
Ashy drongo (<i>Dicrurus leucophaeus</i>)		✓										
White-bellied drongo (<i>Dicrurus caerulescens</i>)		✓										
Spangled drongo (<i>Dicrurus hottentottus</i>)	✓			✓								
Greater racket-tailed drongo (<i>Dicrurus paradiseus</i>)	✓	✓										
Sturnidae												
White-headed starling (<i>Sturnus malabaricus blythi</i>)		✓		✓		✓	✓					
Common myna (<i>Acridotheres tristis</i>)		✓					✓					
Jungle myna (<i>Acridotheres fuscus</i>)							✓					
Common hill-myna (<i>Gracula religiosa</i>)								✓				
Corvidae												
Indian treepie (<i>Dendrocitta vagabunda</i>)		✓					✓		✓			
House crow (<i>Corvus splendens</i>)							✓					
Irenidae												
Gold-fronted chloropsis (<i>Chloropsis aurifrons</i>)		✓		✓								
Jerdon's chloropsis (<i>Chloropsis cochinchinensis</i>)			✓	✓								
Asian fairy-bluebird (<i>Irena puella</i>)		✓			✓		✓	✓	✓	✓		
Pycnonotidae												
Grey-headed bulbul (<i>Pycnonotus priocephalus</i>)									✓			
Ruby-throated bulbul (<i>Pycnonotus melanicterus gularis</i>)							✓			✓		
Red-vented bulbul (<i>Pycnonotus cafer</i>)		✓					✓		✓	✓		
White-browed bulbul (<i>Pycnonotus luteolus</i>)							✓					

Table 2: Plants visited by birds for nectar/fruits (contd.)

Bird Visitors	Plant Species											
	1	2	3	4	5	6	7	8	9	10	11	12
Muscicapidae												
Jungle babbler (<i>Turdoides striatus</i>)		✓										
Oriental magpie-robin (<i>Copsychus saularis</i>)					✓		✓					
Pied thrush (<i>Zoothera wardii</i>)								✓				
White-throated thrush (<i>Zoothera citrina cyanotus</i>)					✓		✓	✓	✓			
Blackbird (<i>Turdus merula</i>)					✓			✓	✓			
Paridae												
Great tit (<i>Parus major</i>)							✓					
Dicaeidae												
Plain flowerpecker (<i>Dicaeum concolour</i>)		✓										
Nectariniidae												
Purple sunbird (<i>Nectarinia asiatica</i>)			✓	✓								
Little spiderhunter (<i>Arachnothera longirostra</i>)		✓										
Ploceidae												
Yellow-throated sparrow (<i>Petronia xanthocollis</i>)							✓					
Total	4	16	4	7	7	5	22	9	8	6	4	1

Plant species codes: 1. *Careya arborea*, 2. *Helicteres isora*, 3. *Firmiana colorata*, 4. *Loranthus* spp., 5. *Sterculia guttata*, 6. *Lannea coromandelica*, 7. *Macaranga peltata*, 8. *Persea macrantha*, 9. *Zizyphus oenoplia*, 10. *Grewia tilaefolia*, 11. *Dillenia pentagyna*, 12. *Cleistanthus collinus*

Macaranga peltata attracted the greatest number of birds (22 species), followed by *Helicteres isora* (16 species) and *Persea macrantha* (9 species). A few other plant species not included in the list which also attract birds are: *Clitoria ternatea* - 7 bird species, many of which consume floral parts as well as nectar (Santharam 1997); *Albizia odoratissima* - which

flowers in April, attracting several sunbirds that feed on its nectar; *Erythrina* and *Lantana* also attract several birds.

Even without accounting for other bird species that could be seen on *Ficus* and *Bombax* and several other plants, the present study based on casual notes revealed that nearly 40% of the forest avifauna consumes nectar and / or fruits

in a Moist Deciduous Forest of the Western Ghats. This list does not include several typical frugivores and nectarivores and so the actual figure could be much more — 50% or more of the species. The reason for this food habit is the presence of a large number of plants that produce nectar and fleshy fruits in the tropics that are adapted for bird and mammal consumption (Howe and Smallwood 1982). For instance, in the Dry Evergreen Forests of southeastern India, 72% of the native woody plants possess fleshy fruits (Narasimhan *et al.* 1993), which can be eaten by birds.

A critical study of the dispersal patterns of seeds, their germination rates and level of seed predation could determine how dependent these plants are on birds as well as other mammalian agents for their dispersal and survival. These, in turn, could indicate the conservation priorities in the Moist Deciduous Forests.

Some interesting observations were made on the foraging behaviour of some birds, feeding on the arillate seeds of *Sterculia guttata* from the dehisced follicle. Many of these fruits were present on terminal branches and access was possible only by hovering. At least three of the seven bird species (Oriental magpie-robin

Copsychus saularis, Asian fairy-bluebird *Irena puella* and white-throated ground thrush *Zoothera citrina cyanotus*) feeding on this tree were seen hovering to pick the seeds. The white-throated ground thrush was found to be more arboreal in its feeding habits than is suggested by its name. It visited four tree species besides *Ficus* spp. for fruits and also fed on the nectar of *Bombax ceiba*, often about 15 m from the ground.

ACKNOWLEDGEMENTS

This study was conducted during my doctoral research on woodpeckers and funded by the Wildlife Conservation Society, New York, USA. I thank Dr. N. Sasidharan of Kerala Forest Research Institute, Peechi who helped with the plant identification.

May 4, 2001

V. SANTHARAM
*Institute of Bird Studies
 & Natural History,
 Rishi Valley Education Centre,
 Rishi Valley P.O. 517 352,
 Chittoor District,
 Andhra Pradesh,
 India.*

REFERENCES

- ALI, S. & S.D. RIPLEY (1983): Handbook of the Birds of India and Pakistan (Compact Edition). Oxford University Press, New Delhi.
- ATHREYA, V.R. (1996): List of avian frugivores recorded at four species of fruiting strangler figs at Karian Shola Wildlife Sanctuary (*sic*), Western Ghats, India. *Newsl. for Birdwatchers* 36(2): 34-35.
- HOWE, H.F. & J. SMALLWOOD (1982): Ecology of seed dispersal. *Ann. Rev. Ecol. Syst.* 13: 201-228.
- KANNAN, R. & D.A. JAMES (1999): Fruiting phenology and the conservation of the great pied hornbill (*Buceros bicornis*) in the Western Ghats of Southern India. *Biotropica* 31(1): 167-177.
- KARTHIKEYAN, S. (1996): Bird attracting trees and birds of Shevaroys and Kolli Hills. *Newsl. for Birdwatchers* 36(3): 49.
- NARASIMHAN, D., JOHN MATHEW, KAVIN PAULRAJ, S.M. SELVARATHINAM & P. DAYANANDAN (1993): Frugivorous birds and the conservation of dry evergreen forest. *In: Bird conservation — strategies for the Nineties and beyond* (Eds: Verghese, A. *et al.*). OSI pp. 28-30.
- RAJASEKHAR, B. (1995): Observations of frugivory of *Michelia nilagirica* — A shola forest tree. *Newsl. for Birdwatchers* 35(5): 81-84.
- SANTHARAM, V. (1996a): Visitation patterns of birds and butterflies at a *Helicteres isora* Linn. (Sterculiaceae) clump. *Curr. Sci.* 70: 316-319.
- SANTHARAM, V. (1996b): *Helicteres isora* — a keystone species. *J. Bombay. nat. Hist. Soc.* 93: 316-317.
- SANTHARAM, V. (1997): Flower eating by birds in India. *Forktail* 12: 157-161.
- SHAHABUDDIN, G. (1993): Avian frugivory on *Persea macarantha* (*sic*), an evergreen tree species, Peechi-

Vazhani Wildlife Sanctuary. *Newsl. for Birdwatchers* 33(2): 20-21.

THIRUMURTHI, S. & C.P. BANUMATHI (1998): *The Melia*

azadirachta tree — a keystone species for frugivorous birds in Himachal Pradesh. *Newsl. for Birdwatchers* 38(4): 68-69.

32. *CLEOME SCAPOSA* DC., CAPPARACEAE — A RARE SPECIES FOR SAURASHTRA

(With one text-figure)

While surveying the vegetation of Saurashtra University Campus, Rajkot, Saurashtra, Gujarat an interesting species of *Cleome* was observed near a puddle of stagnant rainwater in a small colony and in isolation on gravelly sandy soil. On critical examination, the specimen was identified as *Cleome scaposa*, a species reported earlier by Shah (1978) as occurring in Saurashtra. However, it has been not documented by Thaker (1910), Santapau (1962), Santapau and Janardhana (1967) and,

Bole and Pathak (1988). Its habit and habitat with a brief description and illustration is given here.

Cleome scaposa DC. Prodr. 1: 239, 1824; Fl. West Pak 34: 30, 1973.

Herb, annual, 10-18 cm tall. Slender, erect, unbranched, hairy with glandular hairs. Leaves simple, suborbicular to ovate-elliptic, scabrous; petiole 5-15 mm long, ciliate hairy; upper leaves almost sessile. Inflorescence raceme lax, elongated, increasing up to 14-15 cm in fruit,

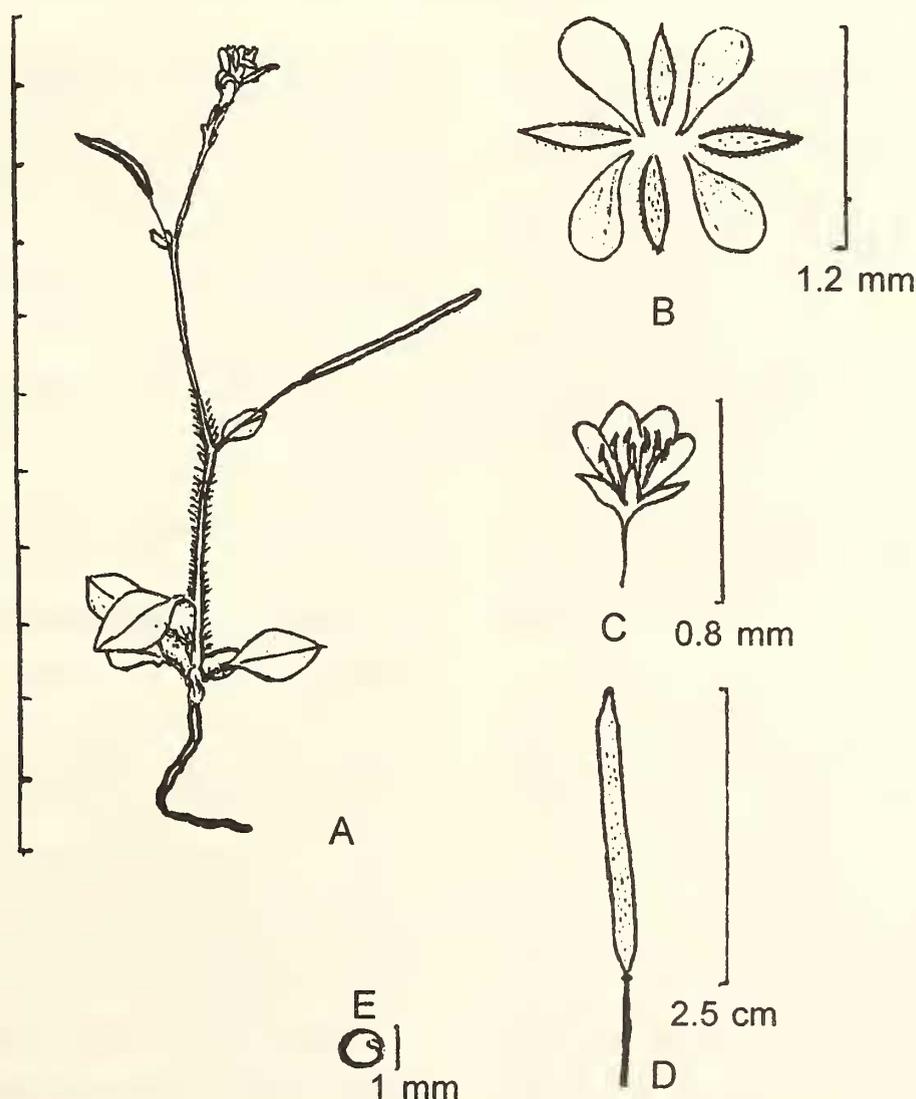


Fig. 1: *Cleome scaposa* DC.; A. Habit, B. Sepals and petals, C. Flowers, D. Fruit, E. Seed